

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
9 December 2004 (09.12.2004)

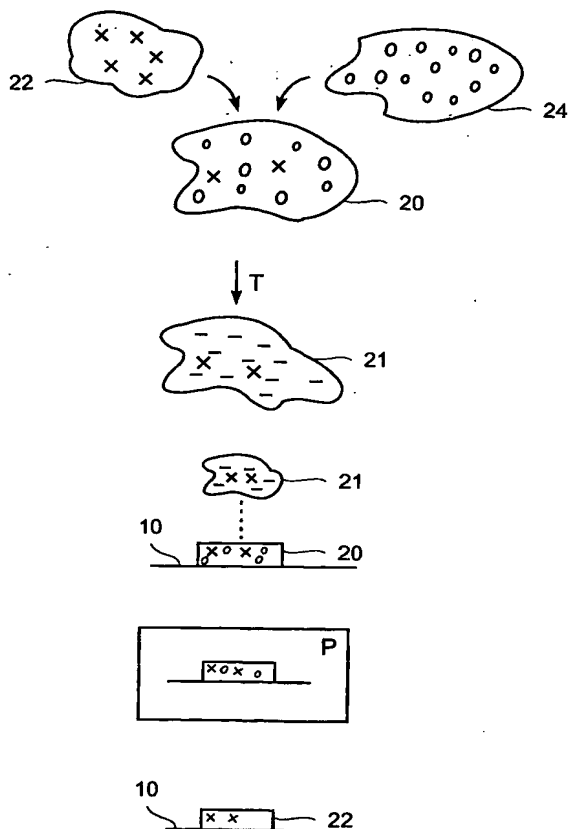
PCT

(10) International Publication Number  
**WO 2004/107472 A1**

- (51) International Patent Classification<sup>7</sup>: **H01L 51/40**
- (21) International Application Number:  
PCT/IB2004/001379
- (22) International Filing Date: 28 April 2004 (28.04.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
03405403.1 3 June 2003 (03.06.2003) EP
- (71) Applicant (for all designated States except US): **INTERNATIONAL BUSINESS MACHINES CORPORATION** [US/US]; New Orchard Road, Armonk, NY 10504 (US).
- (72) Inventors; and  
(75) Inventors/Applicants (for US only): **RIEL, Heike E** [DE/CH]; Saeumerstrasse 69, CH-8803 Rueschlikon (CH). **RIESS, Walter** [DE/CH]; Vordere Augustinergasse 7, CH-8800 Thalwil (CH). **KARG, Siegfried F** [DE/CH]; Foerliweidstrasse 52, CH-8134 Adliswil (CH).
- (74) Agents: **KLETT, Peter, M.** et al.; IBM Research GmbH, Zurich Research Laboratory / IPL, Saeumerstrasse 4 / Postfach, CH-8803 Rueschlikon (CH).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,

[Continued on next page]

(54) Title: HIGH-RESOLUTION PATTERNING



(57) Abstract: The present invention describes a method to pattern organic and/or inorganic or biological molecules by a printing technique for the use in semiconductor devices, circuits, sensors, biological patterns, biochips, and displays using these layers. One or more species or mixtures of organic molecules, oligomers or nanoparticles (22) are added to a phase-change transfer material (24). The obtained mixture (20) or part of it is heated (21) to the melting temperature of the phase-change material and deposited onto a substrate e.g. a thin film transistor for a full-color display. The heated mixture (21) solidifies instantaneously when it hits the substrate. The phase-change material is then removed by sublimation and a patterned layer of organic and/or inorganic or biological molecules remains on the substrate. The deposition can be repeated to cast multiple layers on top of each other.



TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

- (84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— with international search report

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.